Empirical Analysis Of The Efficiency Of The Banking Sector In Western Balkan Countries[1]

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Abstract

Financial intermediation plays a crucial role in the economy of both the developed and the developing countries. At the same time, the banking sector represents the leading financial intermediary through which developing countries can enhance or boost economic growth in their country. The importance is given to the profitability and efficiency of the banking sector for fulfilling such macroeconomic objectives of the country.

In this regard, the main objective of this study is to analyse the efficiency of the banking sector of Western Balkans countries by utilizing secondary data collected from the official reports of the National Banks of the respective countries for the period 2004 – 2020. Thus, Data Envelopment Analysis was implemented to analyse the efficiency of the banks in Western Balkan for the period 2004 – 2020. Moreover, DEA results conclude that banks in Western Balkans operate at a good efficiency level due to an average score above 85% from 2004 – 2020. Montenegro had a continuous high-efficiency score during the last five years, followed by Serbia, Bosnia and Herzegovina, Kosovo, Albania, and North Macedonia.

In the light of the results of the efficiency of the banking sector of the Western Balkans and the specific analysis of the case of the Republic of North Macedonia, specific policy recommendations are given to improve the efficiency of banks in the Republic of North Macedonia.

Keywords: Efficiency, Banking Sector, DEA, Western Balkans.

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1. INTRODUCTION

The bank represents a financial institution that has as a primary activity and objective the collection of deposits and the granting of loans, as well as the execution of payment transactions. Worldwide the banks are the most important financial institutions, measured by their participation in the total assets of the financial sector.

Banks play an essential role in society because they are the lifeblood of the financial system. They are even more significant, especially in countries in transition and developing countries, where financial markets still need to be developed or are in the process of creating. In addition to their traditional services, banks also offer other types of services, from currency and securities trading to leasing and insurance services. Innovation and expansion of a bank's services continue, especially not in times of globalization and a more extended period of low-interest rates where operations need to be justified and the ultimate primary goal achieved - making a profit. This lets us know that the banking system plays a vital role in supporting economic activity and, at the same time, can represent a basis for investment ventures and technological innovation.

Globalization, the rapid and advanced development of technologies and the trend of low interest rates did not bypass the countries of the Western Balkans. The Western Balkan countries are especially dependent on trade from the largest economies. The liberalization of financial markets and integration into the European Union (EU) make them even more connected and dependent on developments in the EU. Therefore, prudent management of banks' profitability and efficiency in such a dynamic environment is crucial.

There are various areas of inquiry on this topic. The central objective of this study is to analyze the efficiency of the banking sector in the region of Western Balkans by utilizing secondary data from esteemed institutions such as National Banks of the respected surveyed countries of the Western Balkans for the period 2004 – 2020. A critical methodology used to analyze banks' efficiency is the DEA methodology. In this paper, the CCR model will be applied as one of the most used models in the application of DEA.

So far, there exists plenty of theoretical and empirical research that has been dealing with the analysis and investigation of the efficiency of the banking sector of developed and developing countries; however, this study is focused on the empirical research of the efficiency of the banking

sector of the countries of Western Balkans. Thus, Data Envelopment Analysis has been used to determine the efficiency of the banking sector of the Western Balkan countries. Such results will be used as an essential contribution to the existing empirical literature about the efficiency of the banking sector of developing countries, particularly as findings and evidence for the banking sector of the Western Balkan region.

Taking into account the main objective of the work, the structure of this study is organized in a first section, which is dedicated to the "Introduction", where the main purposes and objectives are represented and discussed. The second section, entitled "Literature Review", illustrates the existing theoretical and empirical literature on the efficiency of the banking sector. The third part deals with the "Research Methodology". On the other hand, the fourth section, titled "BANK EFFICIENCY IN THE WESTERN BALKANS COUNTRIES", analyses the efficiency results of the banking sector in the countries of the Western Balkans region. Finally, in the last section the main conclusions are presented as well as the recommendations given based on the empirical findings taken from the results of the empirical analysis of the efficiency of the banking sector in the Western Balkans.

2. LITERATURE REVIEW

The banking sector plays a crucial importance in the economy; therefore, they must be profitable due to the role of the stability of the financial system at the time of economic crisis that we have faced even recently with the Covid–19 pandemic as well as the financial problems in 2007. Many papers and research have tried to determine the factors that can affect the banks' profitability and efficiency since this acknowledgment will have a significant role for different groups of individuals and firms like managers, investors, and even the governments.

There is empirical evidence investigating the determinants of bank profitability at different levels and directions, as well as the efficiency of the banking sector in developed and developing countries, using different approaches. However, the results are mixed and controversial; therefore, the main objective of this research is to create a comprehensive model that incorporates the bank-specific and macroeconomic determinants that impact the profitability and efficiency of the banking system.

The productivity measurement could be done in two ways; by using the productivity level and productivity trend. The productivity ratio shows a level at a given time, a relation between an output produced and a combination of inputs utilized in the process. Using the ratio analysis could provide insignificant data considering the effect of the scale economy and overall measurement of a bank's performance. The ratios are used to identify trends over time for one bank or to compare two or more banks at one point (Knežević et al., 2011). As an alternative to traditional bank tools for bank efficiency management, the frontier DEA analysis was used to enable management to objectively identify the best practices in the dynamic environment in which banks operate (Yang, 2009). DEA comprehensively analyzes the relative efficiencies for defined inputs and outputs (Banker, 1984).

The parametric approach evaluates the parametric function (for example, the cost function) based on statistical data, and the residuals reflect the measure of organization inefficiency (Resti, 1997). SFA supposes that empirical inputs cannot be above the function of the cost function (optimal production). It expresses that the same perspective involves suggesting presumptions about the proper form of production functions; more accurately, it helps receive an econometric estimation of the functional form for the function of production. However, it is worth noting that the efficiency boundary that the parametric approach allows to build is a theoretical ideal, and the researcher, both because of the inefficiency of the object and because of a random error (Berger & Humphrey, 1997), can interpret the deviations from this boundary.

A non-parametric approach does not imply the creation of assumptions about the form of the production function. The efficiency boundary in the case of the non-parametric approach is based on the best Decision-Making Units (DMUs). The approach itself suggests considering each bank as a microeconomic firm that uses resources (inputs) to create a release (outputs) with the help of some production function. The critical disadvantage of this technique is that it is non-statistical, and, therefore, it is difficult to test hypotheses about the results' significance. This disadvantage is almost leveled using the bootstrapping method, which assumes that the proper data distribution can be approximated empirically. This approach allows the researcher to construct a piecewise-linear bound of efficiency as a particular "shell" of actual observations available to the researcher. Deviations from the efficiency boundary are interpreted, in this case, as a result of the inefficiency

of the object (Coelli et al., 2005). This is also an omission of the model since there is no random error.

Furthermore, it is crucial to understand that when using the DEA technique to analyze banking efficiency, the proper selection of variables has the most crucial role. There are three options to configure and choose the variables, and each of them ensures the evaluation of the banks in a particular way to highlight your objectives. It should be noted that the methods of "production" and "intermediation" are derived from cases of an original one. In general, the results obtained with the three approaches, according to (Golovan, 2006), do not differ. However, the author points out that the modified approach is preferable, as it allows deposits to be treated in a more general way.

Although the banking industries of emerging economies are more studied than the industries of the other economies, in the existing literature, many studies have investigated the efficiency of baking systems in developed and developing countries using the DEA approach.

Aleskerov et al. (2009) in their article, have stated that the analysis of bank efficiency can be adequately carried out using the data envelopment analysis approach. While the quantitative indicators used are not complex, such as the number of newly opened transaction accounts for the period, interest income from disbursed loans. Sometimes, especially within the US banking system, the aggregate rating of the bank's performance is used, for example, CAMEL (Vishnyakov, 2001).

These techniques captivate the researchers with their simplicity but produce a one-sided cutoff of the defined position. They do not give a full image of the present situation compared to the DEA. The notion of technical efficiency was first formulated and introduced in work (Koopmans, 1951).

Moreover, it is known that the DEA approach was initially introduced by Charnes, Cooper, and Rhodes (1978), known as the CCR method, and assumed constant return to scale (CRS). There is no significant relationship between the scale of operations and efficiency, together with input orientation. The usage of the DEA technique could not be appropriate in case all DMUs used in the model are performing at an optimal level. Thus, to overcome this limitation, a second modification was introduced as BCC by Banker (1984), based on the presumption of a "variable return to scale" (VRS).

Firdaus and Hosen (2013) gauged the efficiency of ten Islamic banks in Indonesia via the two-stage CRS DEA method from the second quarter of 2010 until the fourth quarter of 2012. Achieved results show that the banks in Indonesia operate on a scale of efficiency between 72.12% and 93.82%, showing that there is a potential for developing efficiency.

Zeitun and Benjelloun (2013) examined the relative efficiency of 12 Jordanian banks over the period 2005-2010, that is, the period after bank deregulation. The authors conducted CRS and VRS DEA model techniques. Within each model, they tested three options of inputs and outputs to discover how the efficiency results are affected by the mix. The results of the current research show that most of the Jordanian banks are inefficient in properly allocating their resources (there was a decreasing trend of cost efficiency management in the observed period) and that the global financial crisis affected the efficiency score of the banking industry.

Using the DEA approach, authors Hosen and Muhari (2014) tried to investigate the efficiency of 73 Sharia Rural Banks in Indonesia for June 2011 - March 2013. Finally, the findings revealed that the average efficiency score for banks in Indonesia for the analysed period was 65.23%.

In their paper, authors Mustafa and Behmood (2015) analyzed the technical efficiency of the banks in Pakistan by investigating 11 commercial banks from 1998 to 2012 by conducting the VRS DEA and CRS DEA, and Malmquist productivity index (MPI), to get the scores of productivities. Moreover, they have divided the period into pre-digital reforms (1998-2005) and post-digital reforms (2006-2012). In addition, the findings suggested that the sector's efficiency was growing in the post-digital period, thus was observed 15% growth in pure technical efficiency, where the average result was 94.2% with the CRS assumption and 97% with the usage of VRS assumption.

Furthermore, by analysing the efficiency of the banks in Serbia, authors Marković et al. (2015) tried to investigate 33 banks from 2007 to 2010 using CRS DEA and MPI. The results revealed no crucial change in the sector's efficiency; thus, the findings suggested that the mean efficiency score equals to 72%.

A recent study by the authors Shyu et al. (2015) analysed the efficiency of 56 banks in Taiwan, Hong Kong, and Mainland China for the period 2004-2009 by using a three-stage DEA model. Their empirical results showed that banks capitalized better; those with operational freedom and

long years of experience in the market have higher slack of waste in deposits, fixed assets, and employee numbers.

Moreover, Soba et al. (2016) investigated the efficiency of 10 Turkish banks during 2005-2015 by utilizing the DEA approach and panel regression analysis. In addition, the findings revealed that board size, major shareholder, and NOC variables have a positive and statistically significant effect on bank efficiency.

Furthermore, a study conducted for the banks in Singapore by Sufian and Majid (2007) analysed the bank efficiency for 1993-2003 using DEA and panel regression techniques. The results claimed that the average efficiency level was relatively high, ie. 95.4%.

By analysing the banks and their efficiency in Brazil, Wanke et al. (2016) used the two-stage DEA model, where they used the outputs of the former model as inputs for the latter one. Finally, the results suggested that banks in Brazil were less efficient, with an average efficiency score of 43%.

In their study, Kutlar et al. (2015) analysed the efficiencies of 23 Turkish banks through the usage of input-oriented CRS and VRS DEA. Finally, their results revealed that all banks were efficient in 2008 and highlighted that smaller banks are less efficient than bigger banks. Similarly, the efficiency of the banks in Brazil was investigated by Cava et al. (2016) for the year 2013 by conducting the CRS DEA model. The empirical findings revealed that 26 banks are efficient, and the average efficiency score is 49%, which is not very high.

Authors Thu and Bhaiyat (2016) analysed the efficiency of Vietnamese banks during the period 2011-2014 by using the CRS and VRS DEA models. The empirical findings revealed that the mean efficiency score is 87%, indicating that Vietnamese banks were operating at 13% waste of banking resources.

Sanjeev (2006) investigated the efficiency of the banks in India for the period 1997-2001 by including data from 27 public banks and 33 private and 38 foreign banks. Using the DEA methodology, the results revealed that public banks are less efficient than private and foreign banks and that the efficiency scores negatively correlate with the percentage of non-performing loans. Further, by using the DEA model approach, Mostafa (2009) analysed the efficiency of 85 Arab banks for the year 2005 by using the CCR and BCC and DEA, indicating that the average efficiency score is 31%.

In addition, authors Gaganis and Pasiouras (2009) analysed the efficiency of banks in Greece from 1999-2004 using the DEA approach. Moreover, the findings suggested that the efficiency score for these banks during the analysed period was 73.25%.

In Algeria, the efficiency of the banks was analysed by Henni and Chachoua (2016) for the period 2009 – 2013 by using the CRS DEA model. The findings at the end showed that they could not accept their central hypothesis that government intervention helps domestic banks to improve their efficiency. On the other hand, Ramakrishna et al. (2016) investigated the efficiency of the banks in India for the period 2002-2013 by using the VRS DEA model. By dividing the banks into three groups, they stated that the efficient score for all three groups was 73%.

As was already mentioned, plenty of studies have investigated banks' efficiency in developed and developing countries using different methodologies. However, since this research used the DEA approach, important papers of different authors using this technique in their studies to analyse bank efficiency by discussing their approaches and comparing their empirical results were summarized.

3. RESEARCH METHODOLOGY

The research methodology of this study consists of the investigation of the efficiency of the banking sector of the Western Balkan countries for the period 2004 – 2020 by utilizing the Data Envelopment Analysis – DEA, by utilizing the MaxDea 8 software. In this regard, three inputs (assets, size, and deposits) and two outputs (loans and interest income) have been included in the DEA model, as well as two intermediary variables (GDP -capita and inflation rate).

Data Envelopment Analysis represents a mathematical programming-based technique that can be used to evaluate the relative performance of firms or organizations. While the primary applications have been in the evaluation of not-for-profit organizations, this technique can be successfully applied to other situations competing with other techniques such as cost-benefit analysis and multi-criteria decision making as can be seen, for instance, in a recent study about the best choice for traffic planning, namely, the design and location of a highway in Memphis (Bougnol et al., 2005)

Data Envelopment Analysis was initially introduced by Charnes et al. (1978) based on the research of Farrell (1957), who defined a simple measure of a firm's efficiency that could account for multiple inputs. DEA is a non-parametric linear programming approach capable of handling multiple inputs and outputs (Asmild et al., 2004). This technique ensures conducting different

forms of "input" and "output" together. A DEA technique can be developed to reduce inputs or boost the outputs. An input orientation objects to reducing the input amounts as much as possible while keeping at least the present output levels. In contrast, an output orientation aims at maximizing output levels without increasing the use of inputs. (Cooper & Lovell, 2000).

3.1.SPECIFICATION OF THE DATA

The primary purpose of this study is to analyze the efficiency of the commercial banks operating in six countries from the Western Balkan region for the time spin 2004 – 2020 such as Albania, Bosnia & Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia, where two analyses were conducted.

Firstly, it investigated the efficiency of the banking sector of the Western Balkan countries for the period 2004 – 2020 by utilizing the Data Envelopment Analysis – DEA, where three inputs (assets, size, and deposits) and two outputs (loans and interest income) have been included in DEA model, as well as two intermediary variables (GDP -capita and inflation rate).

Table 4.4. Variables – explanation, acronyms, and source.

VARIABLE	ACRONYM	SOURCE
Assets	assets	National Banks of WB
Size of bank	size	National Banks of WB
Deposits	deposits	National Banks of WB
Loans	loans	National Banks of WB
Interest income	interest_income	National Banks of WB
GDP per capita	gdp_cap	World Bank
Inflation rate	inflation	World Bank

Source: author's source

The following table shows the descriptive statistics of the variables included in the first analysis, where it is investigated the efficiency of the banking sector of the countries in Western Balkans for the period 2004 - 2020. As we can see, the number of observations for assets is 100. At the

same time, for the deposits and size of banks, we have a total of 102 and 100 observations, respectively, for the countries of Western Balkans for the corresponding period 2004 - 2020. The total number of observations for GDP per capita growth and the inflation rate is 102. Regarding the mean value of assets, deposits, and bank size, we have 9696.4, 6741.5and8.81, respectively, while for loans and interest, income is 6298.2 and 152.8.

Furthermore, the mean value of GDP per capita and the inflation rate is 2.88 and 2.67. The bank's standard deviation of assets, deposits, and size has marked the values of 8815.6, 6710.7, and 0.8679, while the same for loans and interest income is 7061.03 and 93.9. In addition, the standard deviation of GDP per capita and the inflation rate is 3.42 and 3.25. The minimum value of assets, deposits, and size is 816.5, 273.1, and 6.71, respectively, while the maximum values are 40877.4, 36672.9, and 10.62. The minimum and maximum GDP values per capita are -15.2 and 10.15, respectively. The minimum value of the inflation rate is -2.42, while the maximum value is 16.25, as reflected in the following table.

Table4. Descriptive Statistics (DEA analysis for Western Balkans, 2004 - 2020)

Variables	Number of observations	Mean value	Standard deviation	Minimal value	Maximum value
Assets	100	9696.4	8815.6	816.5	40877.4
Size	100	8.81	.867	6.71	10.62
Deposits	102	6741.5	6710.7	273.1	36672.9
Loans	100	6298.2	7061.0	373.6	32124.09
Interest Income	49	152.8	93.9	23.88	354.66
GDP - capita	102	2.88	3.42	-15.2	10.15
Inflation rate	102	2.67	3.25	-2.42	16.25

Source: author's calculations.

4. EMPIRICAL RESULTS OF THE EFFICIENCY OF THE BANKS IN THE WESTERN BALKANS

The following table represents the results from the DEA analysis, where firstly it needs to be taken into account that one of the main advantages of the DEA model is that different input and output variables can be used in the model, and where the efficiency scores depend on the sample and

variables that are selected to be covered in the model, and therefore results show relative efficiency measures.

Table2. Data Envelopment Analysis Results (Western Balkans)

AVERAGE EFFICIENCY SCORE WESTERN BALKANS BANKS (2004 – 2020)						
	Kosovo	**Albania**	**N.Macedonia**	**Montenegro**	**Serbia**	**Bosnia**
2004	0.84384	0.197021	0.614652	0.746430371	0.771596567	0.984323
2005	0.910414	0.858738	0.817041	0.966534691	0.965515433	0.85916
2006	0.964836	0.934415	0.845692	0.977215091	0.983038776	0.831946
2007	1	1	0.882318	1	1	0.801785
2008	0.97738	0.959407	0.848314	1	0.968706406	0.792339
2009	0.976736	0.958876	0.853238	0.999636622	0.965397955	0.782212
2010	1	1	0.850004	1	1	0.824472
2011	0.972866	0.962541	0.831463	1	0.961681118	0.856945
2012	0.948083	0.968611	0.824187	1	0.968347763	0.837971
2013	0.941659	0.30741	0.634947	0.862584041	0.780369734	1
2014	0.92865	0.364653	0.651979	0.763091088	0.748990675	0.732399
2015	1	0.448195	0.726471	0.760442699	0.726656861	0.905429
2016	1	0.531674	0.861411	0.960613404	0.842853481	1
2017	0.907559	0.56243	0.834118	0.908798741	0.814088764	0.973682
2018	0.922543	0.93739	0.806204	1	0.962733208	0.933359
2019	1	0.943117	0.829222	1	0.999926074	0.922025
2020	0.968895	0.910165	0.821309	1	1	0.85983

Source: authors' calculations.

In this study, the Data analysis was conducted using DeaMax software using the variable return-to-scale DEA technique, where the focus is on the output. This was achieved to understand who are the operating banks that have been shown to have efficiently operated and those that have to increase the efficiency through a higher level of output variables. Furthermore, the following figure illustrates the results received from the output-oriented DEA model with a variable return to scale. From the discovered results, it can be concluded that banks in Western Balkans operate at a good efficiency level due to an average score above 85% from 2004 – 2020. Montenegro had a continuous high-efficiency score during the last five years, followed by Serbia, and Bosnia and Herzegovina. Albania had a low average efficiency score below 85% in 2004, 2013, 2014, 2015, 2016, and 2017, but in 2018 and 2019, it increased its average efficiency score to above 85%. The banks in North Macedonia had a constant average efficiency score from 2004 – 2012, a slide decrease until 2016; then, the average efficiency score remained above 85% from 2016 - 2020. During 2020, the average efficiency score for Western Balkan countries was above 80%, where Serbian banking sector efficiency was the highest during this year, while the efficiency of the banks in North Macedonia, even though higher than 80%, is among the lowest compared with the other Western Balkan countries.

Figure1. DEA analysis of bank sector efficiency, WB, 2004 – 2020.
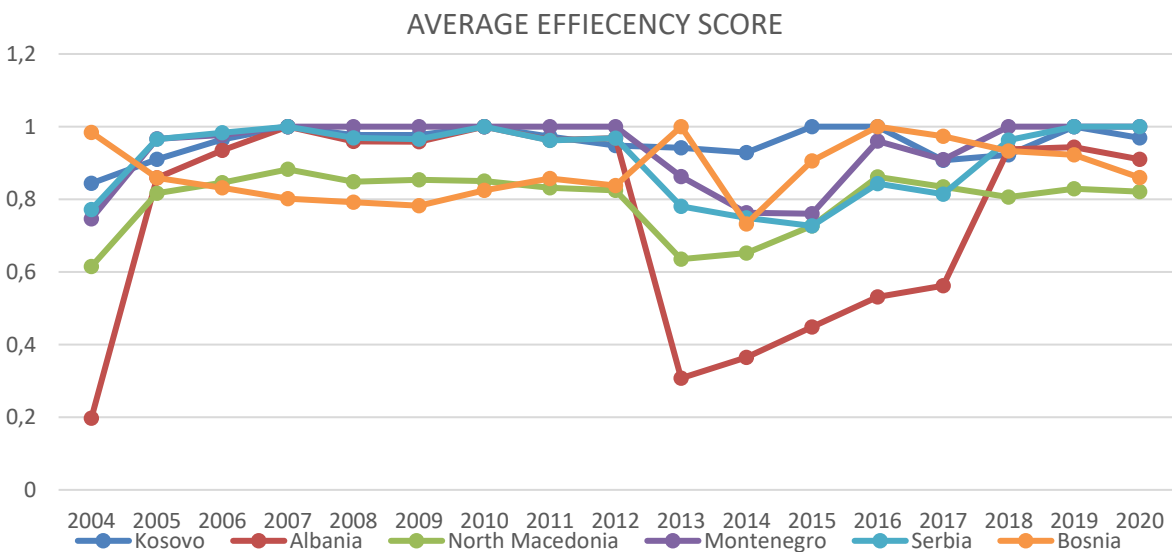
Source: authors' calculations.

5. CONCLUSIONS AND RECOMMENDATIONS

Taking into consideration the importance of the efficiency of the banking sector as well as the mixed results and evidence present in the literature, the primary purpose of this study is to analyse the efficiency of the banking sector of the countries of Western Balkans by using secondary data collected from National Banks of the Western Balkans for the period 2004 – 2020. To realize such objectives, Data Envelopment Analysis (DEA) was conducted to analyse the efficiency of the banks in Western Balkan for the period 2004 – 2020.

From the DEA results, it can be concluded that banks in Western Balkans operate at a good efficiency level due to an average score above 85% from 2004 – 2020. In addition, from the WB countries, Montenegro had at continuous high-efficiency score during the last five years, followed by Serbia and Bosnia and Herzegovina, then by Kosovo, Albania, and North Macedonia.

In the light of the results of the efficiency of the banking sector of the Western Balkans and the specific analysis of the case of the Republic of North Macedonia, specific policy recommendations are given to improve the efficiency of banks in the Republic of North Macedonia.

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